

REMARKS

With reference to the Office action dated June 8, 2004 ["Office action"], the Applicants respectfully request reconsideration of the subject application pursuant to 37 CFR § 1.111 in view of the foregoing amendments and following remarks.

Claims 1-27 and 29-33 are pending. The Applicants have canceled claim 28 without prejudice. The Applicants have added dependent claims 30-33.

The Office action rejects claims 1, 5-8, 13, 15, 16, 18-20, 22-26, 28, and 29 as being unpatentable over U.S. Patent No. 6,026,190 to Astle ["Astle"]. The Office action rejects claims 2, 3, 9, 11, 12, and 14 as being unpatentable over Astle in view of Russ ("The Image Processing Handbook," 2nd ed., CRC Press, 1994, pp. 164-66) ["Russ"]. The Office action rejects claim 27 as being unpatentable over description of conventional lossy compression techniques at pages 2 and 3 of the application (which the Examiner terms "admitted prior art") in view of Astle. The Office action rejects claim 10 as being unpatentable over description of conventional lossy compression techniques at pages 2 and 3 of the application in view of Astle and Russ. The Office action rejects claims 4 and 21 as being unpatentable over Astle in view of U.S. Patent No. 5,625,714 to Fukuda ["Fukuda"]. The Office action rejects claim 17 as being unpatentable over Astle in view of U.S. Patent No. 5,969,764 to Sun et al. ["Sun"]. The Applicants respectfully disagree with these rejections. Further, the Applicants respectfully disagree with the Examiner's characterization of the lossy compression techniques described at pages 2 and 3 of the application.

I. Astle and Russ

With the goal of reaching a shared understanding of the disclosures of Astle and Russ, the Applicants respectfully make the following observations.

A. Astle

Astle describes filtering before encoding of image signals. [Astle, Abstract, Figure 3, 5:45-6:32.] Specifically, Astle describes applying a filter of variable strength *S* prior to a discrete cosine transform ["DCT"] and quantization of the DCT coefficients. [*Id.*]

One type of filter in Astle is a low-pass filter. [Astle, 10:55-11:28.] The low-pass filter is, for example, an *N*-tap low pass filter with which "a pixel's current value is replaced by a

weighted average of its own value and the value of a number of surrounding pixels.” [Astle, 11:67-12:2.] The strength S of the low-pass filter relates to the filter tap ratio. [Astle, 11:12-15.]

Another type of filter in Astle is a non-linear weighted median filter. [Astle, 10:55-11:28.] Astle describes a non-linear weighted median filter that “examines the eight pixels surrounding the pixel to be filtered.” [Astle, 10:58-60.] The highest value H and lowest value L are found. [Astle, 10:60-61.] If the value V of the pixel to be filtered is greater than H , V is replaced with: $((M-S)*V+S*H)/M$, where S is the strength of the filter and ranges from 0 to M . If V is less than L , V is replaced with: $((M-S)*V+S*L)/M$.

B. Russ

Russ describes various aspects of median filtering for still images. [Russ at 165 and 166.] Some techniques involve “ranking of the pixels in a neighborhood according to brightness. Then, for example, the median value in this ordered list can be used as the brightness value for the central pixel.” [Russ at 165.] Russ describes five neighborhood patterns that can be used for median filtering. [*Id.*]

Russ indicates median filtering is “an excellent rejector of certain kinds of noise” [*Id.*] and is “preferred both for visual examination and measurement of images” [Russ at 166]. Russ repeatedly distinguishes median filtering from filtering that involves weighting, for example, in the first paragraph on page 165 and again at page 166 (“There are two principal advantages to the median filter as compared to multiplication by weights.”).

II. Claims 1, 5-8, 13, 15, 16, 18-20, 22-26, and 29

Astle fails to teach or suggest at least one limitation of each of claims 1, 5-8, 13, 15, 16, 18-20, 22-26, and 29. Therefore, claims 1, 5-8, 13, 15, 16, 18-20, 22-26, and 29 should be allowable.

A. Claims 1 and 18

Claim 1, as amended, recites, “based at least in part upon the indicator value, adjusting unweighted median filtering of video information.” Claim 18, as amended, recites, “based at least in part upon the received bitrate indicator, adjusting unweighted kernel-based filtering of

the set of information.” Astle does not teach or suggest the above-cited language from claims 1 and 18, respectively.

Astle describes applying a low-pass filter or non-linear weighted median filter to video. [Astle, Abstract, Figure 3, 5:45-6:32.] The low-pass filter computes a *weighted* average, and the non-linear *weighted* median filter uses a strength parameter S. [Astle, 10:55-11:28.] Either way, the filtering in Astle is weighted filtering, which is different than and leads directly away from, “unweighted median filtering” (as recited in claim 1) and “unweighted kernel-based filtering” (as recited in claim 18). Claims 1 and 18 should be allowable.

B. Claims 6 and 22

Claims 6 and 22 include the above-cited language from claims 1 and 18, respectively, and thus should be allowable. [See section II.A.] In addition, claim 6, as amended, recites, “median filtering a prediction residual.” Claim 22, as amended, recites, “filtering a prediction residual.” Astle does not teach or suggest the above-cited language of claims 6 and 22, respectively.

Astle describes applying a filter to video *prior to* encoding. [Astle, Abstract, Figure 3, 5:45-6:26.] The encoding may include motion estimation [Astle, 5:60-64], which results in prediction residuals. Filtering before encoding, and hence before motion estimation (as in Astle), leads directly away from “median filtering a prediction residual” (as recited in claim 6) and “filtering a prediction residual” (as recited in claim 22). Claims 6 and 22 should be allowable.

C. Claim 20

Claim 20 includes the above-cited language from claim 18 and thus should be allowable. [See section II.A.] In addition, claim 20, as amended, recites, “changing shape of the kernel based at least in part upon the received bitrate indicator.” Astle does not teach or suggest the above-cited language of claim 20.

Astle describes varying the strength S of a filter as part of bitrate control. [Astle, 6:27-32.] Apparently in reference to the non-linear weighted median filter in Astle, the Examiner writes, “The kernel has a 3x3 area. The strength S is adjusted.” [Office action at 4.] Even if, for the sake of argument, the non-linear weighted median filter in Astle were considered to have a 3x3 kernel, Astle describes adjusting the filter by changing S. This is different than and leads away from “changing *shape* of the kernel” (as recited in claim 20).

Apparently in reference to the N-tap low-pass filter in Astle, the Examiner writes, “The filter tap ratio defines the kernel.” [*Id.*] Even if, for the sake of argument, the low-pass filter in Astle were considered to have a 1xN kernel, Astle describes adjusting the filter by changing the filter tap ratio. Again, this is different than and leads away from “changing *shape* of the kernel” (as recited in claim 20). Claim 20 should be allowable.

D. Claims 5, 7, 8, 19, and 23

Claims 5, 7, and 8 include the above-cited language from claim 1 and thus should be allowable. [See section II.A.] Claims 19 and 23 include the above-cited language from claim 18 and thus should be allowable. [See section II.A.] The Applicants will not belabor the merits of the separate patentability of claim 5, 7, 8, 19, and 23.

E. Claims 13 and 24

Claim 13, as amended, recites:

intermittently changing a kernel for filtering the set of video information
... the kernel selected from plural available kernels including at least a first kernel
with a first kernel shape and a second kernel with a second kernel shape different
than the first kernel shape....

Claim 24, as amended, recites, “changing shape of the kernel.” Astle does not teach or suggest the above-cited language from claims 13 and 24, respectively.

Astle describes varying the strength S of a filter as part of bitrate control. [Astle, 6:27-32.] Even if, for the sake of argument, the non-linear weighted median filter in Astle were considered to have a 3x3 kernel, Astle describes adjusting the filter by changing S, not the kernel shape. Changing S for a kernel with an unchanging shape is different than and leads away from the above-cited language of claims 13 and 24, respectively.

Moreover, even if, for the sake of argument, the low-pass filter in Astle were considered to have a 1xN kernel, Astle describes adjusting the filter by changing the filter tap ratio, not the kernel shape. Changing the filter tap ratio for a kernel with an unchanging shape again is different than and leads away from the above-cited language of claims 13 and 24, respectively.

Claims 13 and 24 should be allowable.

F. Claim 29

Claim 29 includes the above-cited language from claim 24 and thus should be allowable. [See section II.E.] In addition, claim 29, as amended, recites, “filtering ... prediction residuals.” Astle does not teach or suggest the above-cited language of claim 29.

Astle describes applying a filter to video *prior to* encoding. [Astle, Abstract, Figure 3, 5:45-6:26.] The encoding may include motion estimation [Astle, 5:60-64], which results in prediction residuals. Filtering before encoding, and hence before motion estimation (as in Astle), leads directly away from “filtering ... prediction residuals” (as recited in claim 29). Claim 29 should be allowable.

G. Claims 15, 16, 25, and 26

Claims 15 and 16 include the above-cited language from claim 13 and thus should be allowable. [See section II.E.] Claims 25 and 26 include the above-cited language from claim 24 and thus should be allowable. [See section II.E.] The Applicants will not belabor the merits of the separate patentability of claim 15, 16, 25, and 26.

III. Claims 2, 3, 9, 11, 12, and 14

The Examiner has improperly combined Astle and Russ to reject claims 2, 3, 9, 11, 12, and 14. Claims 2, 3, 9, 11, 12, and 14 should be allowable.

The Examiner writes:

It is desirable to have flexibility to select various ways for adjusting the strength of median filters. It would have been obvious to one of ordinary skill in the art, at the time of the invention, to add Russ’s approach to include “changing the kernel of median filtering” as a way for changing the strength of median filtering in Astle’s method, because the combination provides flexibility in bit rate control.

[Office action at 6.] Applicants respectfully disagree. The Examiner’s modification of Astle with Russ is improper for at least the following reasons.

The Examiner’s modification changes a principle of operation of Astle, in that Astle emphasizes using weighted filtering and the Examiner has modified Astle to use unweighted filtering. [“THE PROPOSED MODIFICATION CANNOT CHANGE THE PRINCIPLE OF OPERATION OF A REFERENCE.” MPEP 2143.01. 2145.X.D.] The Astle system operates using weighted filtering, either with a low-pass filter (with *weighted* averaging) or with a non-

linear *weighted* median filter. [Astle, 10:55-11:28.] Astle repeatedly emphasizes changing filter weights to accomplish rate control. [See, e.g., Astle, 2:35-38, 5:45-46, 10:49-11:25, and 12:23-13:60.] In contrast, the median filters in Russ do not use weights. [Russ at 165 and 166.]

In addition, considering the entire disclosures of Astle and Russ, one of ordinary skill in the art would not have been motivated to modify Astle with Russ as the Examiner has done. [MPEP 2141.02, 2145.X.D.] In particular, in at least the following three ways, Russ leads away from modifying Astle as the Examiner has done.

First, Russ describes using median filtering for noise reduction, visual examination, and measurement of images, but not for bitrate control. Noise reduction, visual examination and measurement involve clarifying an image by removing “shot” noise or other errors. They do not involve processing the image for the sake of lowering bitrate in subsequent encoding. Russ thus leads away from using median filtering for bitrate control.

Second, Russ describes multiple neighborhood patterns and compares the results of filtering with some of the different patterns. Russ does not teach or suggest, however, adaptively changing patterns in response to feedback of any kind. Russ is even further from teaching or suggesting adapting strength of median filtering for bitrate control, as the Examiner has suggested.

Third, Russ notes that median filtering is computationally intensive for still image processing [Russ at 165 and 166], which leads away from using median filtering in video encoding. Video typically has 10, 15, 30, or even 60 or more images per second, and video encoding is even more computationally intensive than still image processing.

IV. Claim 10

As noted in Section III, the Examiner has improperly combined Astle and Russ. The combination of Astle, Russ, and the lossy compression techniques described at pages 2-3 of the application is improper since the combination of Astle and Russ is improper. Claim 10 should be allowable.

V. Claim 27

Claim 27 includes the language of claim 24. As noted in Section II.E, Astle fails to teach or suggest at least one limitation of claim 24. The lossy compression techniques described at

pages 2 and 3 of the application also fail to teach or suggest the above-cited language of claim 24. The Applicants will not belabor the merits of the separate patentability of claim 27. Claim 27 should be allowable.

VI. Claims 4 and 21

Claims 4 and 21 include the language of claims 1 and 18, respectively. As noted in Section II.A, Astle fails to teach or suggest at least one limitation of each of claims 1 and 18, respectively. Fukuda describes distortion removal for decoded image data [Fukuda, Abstract], but fails to teach or suggest the above-cited language of claims 1 and 18, respectively. The Applicants will not belabor the merits of the separate patentability of claim 4 and 21. Claims 4 and 21 should be allowable.

VII. Claim 17

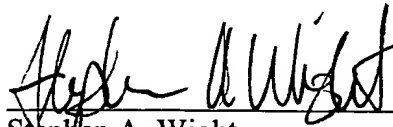
Claim 17 includes the language of claim 13. As noted in Section II.E, Astle fails to teach or suggest at least one limitation of claim 13. Sun describes encoding a sequence of frames including video objects [Sun, Abstract], but fails to teach or suggest the above-cited language of claim 13. The Applicants will not belabor the merits of the separate patentability of claim 17. Claim 17 should be allowable.

CONCLUSION

Claims 1-27 and 29-33 should be allowable. Such action is respectfully requested.

Respectfully submitted,

KLARQUIST SPARKMAN, LLP

By 
Stephen A. Wight
Registration No. 37,759

One World Trade Center, Suite 1600
121 S.W. Salmon Street
Portland, Oregon 97204
Telephone: (503) 226-7391
Facsimile: (503) 228-9446